BY ORDER OF THE COMMANDER
AIR FORCE MATERIEL COMMAND

AFMC INSTRUCTION 21-122

22 DECEMBER 2000

Maintenance

FOREIGN OBJECT DAMAGE (FOD) AND DROPPED OBJECT (DO) AWARENESS AND PREVENTION PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*. It provides policy and guidance for implementing and maintaining a Foreign Object Damage/Dropped Object (FOD/DO) awareness and prevention program within all AFMC units, organization, depots, product centers, test centers, tenants, and contracted services including operating locations attached to an AMFC depot, test, or product center.

SUMMARY OF REVISIONS

This instruction revises AFMCI 21-122, *Foreign Object Damage (FOD) and Prevention Program*. It deletes the distinction between Critical and Non-Critical FOD areas and requires appointment of FOD Prevention focal points in all branches accomplishing maintenance.

Chapter 1

GENERAL POLICY

1.1. Introduction. HQ AFMC/LG and HQ AFMC/DOM provide policy and general program guidance for establishing and monitoring the AFMC FOD/DO Awareness and Prevention Program. This program is designed to eliminate the introduction of any foreign object that could damage an aircraft, aerospace component, or aerospace support equipment operated at any AFMC depot, test center, product center, detachment or remote operating location. This instruction establishes minimum requirements for an effective FOD/DO awareness and prevention program. FOD/DO awareness and prevention will be an integral part of all AFMC Quality Assurance Programs.

1.2. Applicability. This instruction applies to all personnel in AFMC organizations, tenants, and contracted services that work in, on, around, or travel through areas near operational aircraft, engines, munitions, missiles, drones, space systems, support equipment, aerospace ground equipment (AGE), trainers or components thereof. This includes personnel operating vehicles and equipment on AFMC flightlines, runways, taxiways, parking ramps, and in aircraft hangars or maintenance areas. It also applies to all activities and contractors that test, design, or operate aircraft, aerospace components, aerospace support equipment, organizations or shops supplying parts or equipment that will be installed or attached to an aircraft or related equipment. It points out some causes of FOD/DO, methods of preventing, establishes investigation and reporting requirements for FOD/DO mishaps. It explains FOD/DO awareness and prevention program responsibilities and includes training requirements to be met.

NOTE: Local directive will be developed or updated for implementation within 180 days from the publication of this instruction. Recommended changes to this instruction will be forwarded to HQ AFMC/LGP.

1.3. Supplemental Directives. Product directors, wing commanders, or equivalent will publish local directives to supplement the minimum requirements in this instruction with detailed guidance and procedures to ensure effective FOD/DO awareness and prevention programs are established. Operational units within AFMC will also enforce the provisions of AFMCI 21-119, *Objective Center/Test Wing Aircraft Maintenance Management Policy.*

1.4. Terms Explained.

1.4.1. Foreign Object (FO). A substance alien to aircraft, engines, munitions, missiles, drones, space systems, support equipment, AGE, trainers or components thereof that has been allowed to invade the product. Any FO in a maintenance area has the potential to cause damage.

1.4.2. Foreign Object Damage (FOD). Any damage caused by FOs to aircraft, engines, munitions, missiles, drones, space systems, support equipment, AGE, trainers or components thereof, that can be expressed in physical or economic (monetary) terms which may degrade the product causing system or component malfunction, deterioration, or loss of life. All work centers performing maintenance on aircraft, missiles, engines, other major end items, or components thereof have a high potential for FOD.

1.4.3. Dropped Object (DO). A DO is any item, including munitions, inadvertently released, which falls from an aircraft between engine start and shut down, when not directed by the aircrew. Munitions

released in excess of quantity selected by the aircrew, or a multiple release, are not considered DOs. Any object dislodged by a foreign object, e.g., an IFR boom or a bird, is not considered a DO. Preventable DOs are defined as any item, such as aircraft panels, tires, etc., which was lost due to negligence during inspection or improper installation.

1.5. Forms. Locally devised forms for tracking and reporting FOD/DO will not be used without the approval of HQ AFMC/LGP for ALCs and product centers. Test centers will seek approval for locally devised forms from HQ AFMC/DOM. All approved forms for FOD/DO will be identified in local instructions with procedures identified for filling them out and proper routing. All locally devised forms will be developed by management.

1.5.1. AFMC Form 40, **Foreign Object Damage Record**, RCS: MTC-DOM(M)8101.

1.5.2. The Air Force Flight Test Center at Edwards AFB CA and the Air Armament Test Center at Eglin AFB FL, will send AFMC Form 40 to HQ AFMC/DOM by the 15th of each month.

Chapter 2

FOD/DO PREVENTION PROGRAM

2.1. Program Objective. The objective of the FOD/DO Awareness and Prevention Program is to eliminate sources of FOD/DOs. A FOD/DO Awareness and Prevention Program will improve readiness and save lives, material, manpower, and money.

2.2. Center/Wing FOD Awareness and Prevention Officer. The center/wing vice commander will appoint a center/wing FOD/DO awareness and prevention officer. The FOD/DO Awareness and Prevention officer will:

2.2.1. Administer the FOD/DO Awareness and Prevention program.

2.2.2. Ensure all incidents of FOD/DO are reported according to current applicable directives.

2.2.3. Report all class A/B/C or chargeable FOD/DO incidents to HQ AFMC/DOM within 24 hours.

2.2.4. Appoint a team of appropriate personnel to investigate each incident of FOD/DO. At least one member of any FOD investigation team should be trained in jet engine FOD investigation procedures. This team submits a report to the FOD/DO Awareness and Prevention officer.

2.3. FOD Prevention Focal Points. Each director, division chief, and branch chief in a maintenance function will appoint a FOD/DO prevention focal point for their organization. The FOD/DO prevention focal point is responsible to:

2.3.1. Provide FOD/DO prevention information to FOD/DO focal points for subordinate organizations

2.3.2. Conduct periodic FOD inspections and report findings and corrective actions to the chief of the area of responsibility. The frequency of FOD inspections by each focal point will be specified in the local FOD instruction.

2.3.3. Attend FOD/DO Awareness and Prevention Committee Meetings (division and directorate focal points only).

2.4. FOD/DO Awareness and Prevention Committee. The center/wing vice commander or designated representative is the chairman. In his/her absence, a product director or group commander may be appointed to chair FOD/DO meetings. As a minimum, the committee will meet on a quarterly basis. Meeting minutes will be published and distributed to the center/wing commanders and each committee member. Send electronic copy of minutes to all product directors and commanders.

2.4.1. The FOD/DO Awareness and Prevention Committee chairperson makes the final determination on committee membership. As a minimum, the following activities must provide representation:

2.4.1.1. Safety.

2.4.1.2. Civil engineering. (including fire department)

2.4.1.3. Security police.

2.4.1.4. Airfield manager/base operations.

2.4.1.5. Maintenance training.

2.4.1.6. Directors, logistics/operations group commanders, or equivalent.

2.4.1.7. Production and quality divisions.

2.4.1.8. Aircraft maintenance and back shop representation.

2.4.1.9. Flight test

2.4.1.10. Hospital

2.4.1.11. Quality Assurance

2.4.1.12. Contracting

2.4.1.13. Tenant organizations (i.e., operational units, Aero club, etc.).

2.4.2. The FOD/DO awareness and prevention committee's agenda will include, but is not limited to:

2.4.2.1. Status of actions on items from previous meetings. Action items are carried in an "open" status until all actions or corrections are closed out or completed.

2.4.2.2. FOD/DO occurrences since last meeting.

2.4.2.3. Customer reported FO, FOD, and DO on aircraft, missiles, drones, engines, or other components and equipment processed at any AFMC facility.

2.4.2.4. Assignment of specific actions and responsibilities.

2.4.2.5. FO/FOD/DO awareness and prevention program status, improvements, recommendations, motivation, and/or suggestions, including initiatives and suggestions reviews.

2.4.2.6. FO/FOD/DO awareness and prevention program awards and publicity.

2.4.2.7. Tool control and accountability issues.

2.4.2.8. Lessons Learned from other MAJCOM, base, centers, and units FOD/DO awareness and prevention committees.

2.5. FOD Training. FOD awareness and prevention training will be conducted and documented annually for all personnel (see AFMCI 21-108, *Maintenance Training and Production Acceptance Certification (PAC) Program*. Minimum FOD awareness and prevention subjects to be emphasized are:

- Common causes of FOD and those, which are peculiar to the type of aircraft, other major end items, support equipment, engines or components assigned to or serviced by the organization.

- Hardware and tool control and accountability policies for end of task, end of shift, and transfer at work site.

- Individual responsibilities to prevent FOD.

- Local backshop, flightline, taxiway, aircraft parking ramps, and hangar work area FOD policies.

- Procedures for preventing FOD from tool sources, as prescribed in AFMCI 21-107, *Tool Control and Accountability Program.*

2.5.1. Supervisors will brief newcomers on FOD awareness and prevention prior to starting work, and within 10 workdays of reporting to duty. FOD brief must be documented. Individuals TDY, trans-

ferred or loaned from another unit will receive a local FOD briefing prior to beginning work in that area. AFMC personnel (including base civil engineer, and services), tenants, or contractors working in depot maintenance will be briefed before beginning work.

2.5.2. Quarterly briefings on FOD awareness and prevention will be given to all supervisors, maintenance, operations, and base support personnel (including fire department and security forces) working in or around aircraft, other major end items, support equipment, engines, or components. These briefings will be documented, and included as part of the unit's periodic news breaks or staff meetings and should include a review of the FOD awareness and prevention committee minutes and any unique requirements of the unit that could affect FOD awareness and prevention.

2.6. Publicity. Publicity is a key element of an effective FOD/DO Awareness and Prevention Program. Information on posters and other materials to establish and maintain an awareness of the need to prevent FOD/DO can be obtained from your center/wing safety office. Awards for FOD prevention will be given publicity by base papers or other news media. Competitive programs in FO/FOD awareness and prevention between organizations, units, branches, sections, and shops are strongly encouraged.

2.7. Host-Tenant Support Responsibilities. For host-tenant general policy, refer to AFI 25-201, *Support Agreement Procedures.*

2.7.1. The host unit is responsible for establishing a FOD/DO Awareness and Prevention Program. Additionally, they will provide services to meet the requirements of the Air Force Mishap Prevention Program, including the reporting requirements for tenant units to their major command.

2.7.2. Host units without flying wings will negotiate FOD/DO Awareness and Prevention Program responsibilities with a tenant-flying wing by mutual consent or within the guidelines of AFI 25-201.

Chapter 3

PREVENTING FOD

3.1. General. There are many causes of FOD. Two major contributors are poor housekeeping and poor work habits such as not accounting for hardware, safety wire, tools, etc., during operations and maintenance. All loose objects, regardless of their origin, can cause catastrophic and costly damage to an aircraft, major end item or loss of life.

3.2. FOD Prevention Practices. FOD awareness and prevention is everyone's responsibility. Some FOD prevention requirements are listed below:

3.2.1. Plug or cap all openings, ports, lines, hoses, electrical connections, and ducts on aircraft, engines, munitions, missiles, drones, space systems, support equipment, AGE, trainers or components to prevent FO from entering these systems. All necessary caps, plugs, covers etc. will be made readily available by management, for use by aircraft maintenance personnel in their immediate work area for the prevention of foreign object damage.

3.2.2. Aircraft undergoing repair with engines installed will have inlet covers installed any time maintenance is not being performed in these areas or the engines are not being operated. Video tape recorder tapes, checklists, or any other foreign objects will not be placed in or on engine intakes.

3.2.3. Prior to engine start and after engine shut down, maintenance ground test cell runs, and any engine intake or exhaust maintenance, each engine intake and exhaust will receive a FOD inspection to include the ramp area within 25 feet of the intake. Aircraft engine and pitot static covers should remain installed on aircraft at all times other than during operation of the aircraft or when performing maintenance, or inspections of the areas. Special emphasis is required for items such as remove before flight streamer attachment, safing pin condition, hinge pin security, dust and FO prevention cover condition/security and aircraft forms binder condition.

3.2.4. Hats will not be worn within the danger area of an operating jet engine. Each ALC/product center/test center/base will develop local policy governing the wearing of hats on the flightline. Climate and safety will be considered.

3.2.5. All personnel will empty pockets when performing intake/exhaust inspections.

3.2.6. Restricted area/identification badges will be secured to each individual with a nylon/cotton cord or a plastic armband to prevent loss and possible FOD when performing intake/exhaust inspections and when within 25 feet of an operating jet engine.

3.2.7. Maintain cleanliness of maintenance and manufacturing areas at all times. Keep areas free of FO. A thorough cleanup will be accomplished upon completion of each task and at the end of the shift.

3.2.8. Test centers will develop local procedures to ensure newly assigned structural repair technicians are trained and certified on engine intake maintenance. Establish and tailor rivet replacement procedures for each MDS to be worked on at each ALC/base or test center. Include them as part of the FOD orientation/familiarization for personnel working in these areas. Include work order residue control procedures for all maintenance performed in and around intake and exhaust areas.

3.2.9. Ensure strict control for all tools, equipment, rags, residue, and hardware. Government tools will be marked according to AFMCI 21-107. Personal tools will not be authorized in any maintenance area or on the flight line (e.g., Mini-Mag flashlights, leathermans, buck knifes, etc).

3.2.10. All GOV, contractor, POVs, and any other vehicle operators, including police, fire, ambulance, communication, and POL, will perform a FOD inspection on all equipment and vehicle tires prior to entering a runway, taxiway, flightline areas, or aircraft parking ramps. These areas will be clearly marked with signs and containers available to place FO into. Emergency response vehicles do not have to stop for tire checks when responding to an emergency situation. All GOVs having access to these areas will be equipped with a locally manufactured tool for removing debris from tire treads. This tool will be identified to the vehicle by using the vehicle ID number.

3.2.11. FO containers with self-closing lids will be installed in all flightline vehicles and at all access points to the flightline. Containers will have "FOD" stenciled in contrasting colored letters not smaller than 2 inches. All maintenance production areas will have approved FO containers highly visible and readily accessible to workers. Product Directorates, division chiefs, group commanders or equivalent can authorize small FO collection cans/bags that can be used by personnel when an area collection can is not feasible. All containers will be emptied when full or at the end of the shift, whichever comes first.

3.2.12. Report damaged pavement in and around aircraft traffic and taxi/towing/runup/parking areas to Base Operations immediately upon discovery.

3.2.13. Watches, rings, necklaces, chains, and other jewelry, will not be worn while performing maintenance.

3.2.14. Flashlights with clips will have the clips removed prior to use on or around aircraft, uninstalled engines, and AGE.

3.2.15. Wear pocketless and buttonless coveralls when physical entry is needed to inspect engine intake or exhaust areas. Remove all items from pockets prior to putting on coveralls (watches, wallets, rings, change, other jewelry, pagers, and radios).

3.2.16. Metal insignias/badges will not be worn on the flight line or in aircraft maintenance areas. Escorts of visiting personnel will ensure FOD prevention measures are briefed and taken. Security Police, while performing official duties, may wear the beret with insignia attached, however, when they are within 50 feet of an operating aircraft their beret must be removed and secured. Wigs, hairpieces, metal hair fasteners, and earrings are not authorized on the flight line or in areas where aircraft engines are operated.

3.2.17. When FOD is discovered on a transient aircraft or engine, the host FOD monitor will notify the owning organization within 24 hours. An informational copy will be provided to the owning organization's safety office to ensure compliance with AFI 91-204, *Investigating and Reporting of US Air Force Mishaps*.

Chapter 4

FOD INVESTIGATION AND REPORTING

4.1. FOD Investigation. Each case of FOD will be investigated to determine the cause. The end item will be impounded in accordance with local directives until the FOD investigation is complete. The investigations will use the expertise in maintenance, safety, and other staff agencies as needed. If the unit determines the FOD is attributable to personnel error, it will be included in the FOD rate. Include engine FOD except when:

4.1.1. Damage caused by natural environment or wildlife that cannot be prevented. This includes hail, ice, animals, insects, and birds. Report this type of damage according to AFI 91-204.

4.1.2. Damage from internal materiel failure of the damaged item, as long as damage is confined to that item. An example is failure of a compressor blade in a jet engine, causing damage only in the engine. Report this damage using the deficiency reporting system according with TO 00-35D-54, *USAF Deficiency Reporting and Investigating System.*

4.1.3. Engine FOD caused by material failure of an aircraft component if the component failure is reported on a deficiency report (DR) using the combined class C/Cat II DR reporting procedures of AFI 91-204 and TO 00-35D-54.

4.1.4. Engine FOD found during depot overhaul for maximum operating time.

4.2. FOD/DO Incident Reporting. Known or suspected FOD in an aircraft, missile, drone, support equipment, engine, or component will immediately render it unsafe for use. Engines or aircraft sustaining FOD will be impounded until an investigation is completed. A complete search for the FO causing the damage will be conducted. If nicked engine blades are found, including during a test cell run, the cause will be investigated regardless of the extent of damage. If the damage is within repairable TO limits, then no report is required. Local procedures will be developed for clearing the impoundment forms. All FOD/DO incidents or mishaps will be reported to the center/wing/product directorate quality assurance office, including minor nicks and blemishes on engine blades, which require blending. Preventable and non-preventable FOD incidents over $10,000 at the ALCs and AMARC will be reported to HQ AFMC/LGP and to AMARC, and HQ AFMC/DOM for test centers. When calculating the cost, include replacement parts and manhour costs (field level), or the total depot overhaul cost, as appropriate. The report may be by fax or e-mail, but must be made no later than one duty day after the occurrence. FOD mishaps are also reported according to AFI 91-204.

4.3. FOD Discovered During Acceptance Testing. All AFMC activities will report all FOD discovered during acceptance inspections of aircraft, missiles, drones, engines, or components to the owning organization by priority message within 24 hours after discovery. Send information copies of reporting messages to the owning major command (MAJCOM/LGM/SEF). When AFMC is the owning command, include HQ AFMC/DOM.

4.4. Prescribed Form. AFMC Form 40.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

Abbreviations and Acronyms

AFI—Air Force Instruction

AFMC—Air Force Materiel Command

AGE—Aerospace Ground Equipment

ALC—Air Logistics Center

DO—Dropped Object

DOM—Director of Operations, Maintenance

DOP—Dropped Object Program

DR—Deficiency Report

FO—Foreign Object

FOD—Foreign Object Damage

GOV—Government Operated Vehicle

IFR—In-flight Refueling

LG—Logistics Group

POV—Private Owned Vehicle

TO—Technical Order